

REMARKS

Claims 1-44 are in this application and are presented for reconsideration. By this Amendment, Applicant has amended claims 1, 3, 8, and 18-23 to improve the clarity and style of this application.

By this Amendment, the Applicant has amended several claims to overcome the Examiner's rejections and respectfully makes assertions for overcoming the rejections of the outstanding Office Action dated July 28, 2005 in the following paragraphs.

Claim Rejections-35 U.S.C.§102

Claims 1-1 5, 17, 19-37,39,41-44 have been rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe).

Re Claims 1 and 23:

The Patent Office takes the position that the Watanabe '284 reference discloses method for fading computer-generated information into an image of the real environment detected by an image receiving unit located on a viewing device, Wherein there is a determination of a position and an orientation or pose of the image receiving unit and that robot-specific information corresponding to this determination is faded over the image of the real environment on the viewing device.

The prior art as a whole including the Watanabe reference neither teaches nor suggests the present invention as claimed. Watanabe discloses a type of feature which can be faded into the image of a real environment. However, what the Watanabe reference discloses is only that

an image of the workpiece is recorded and the welding path measured by an optical sensor (light section sensor) is faded in. These sensors are work-piece related and not robot specific. In other words, the sensors detect a third party object and not the robot itself. This is self evident according to the process disclosed by the Watanabe reference.

The course of the process according to the Watanabe reference provides only for measuring the working line (weld seam) of a component by measuring sensors (light section sensors) and for automatically "teaching" the path thus measured (column 1, lines 47-54). The path is faded into the image of the workpiece and the user is asked to set points of the path manually (by clicking with the mouse)(column 5, lines 6-17) only in the case the working line or the measured path is not detected by the measuring sensors, if it is not detected by them completely, or if it is detected with an error.

Therefore, the information is represented according to the Watanabe reference, in different process step and for different purpose than according to the present invention. The provisions are made according to the present invention for displaying abstract information, i.e., information that is not visible to the user and is consequently not foreseeable to him, in order to give the user the proper feedback information. The robot-specific conditions actually occurring are indeed visualized for the user.

Contrary to the present invention as claimed, no actually occurring robot specific conditions are displayed according to the Watanabe reference, but the user is somewhat asked precisely in the absence of such an unambiguous condition to enter a correct information.

Generally speaking, by fading in the path, the Watanabe reference discloses and only

askes the user a question, whereas the present invention makes provision for providing the user with answers by the fading in.

The Examiner's attention is directed to column 12, lines 7-20 which, contrary to the position taken by the Patent Office, fading in a system of coordinates into an image is not disclosed in the Watanabe reference. It is only described in the Watanabe reference that a system of coordinates can be transformed into another system of coordinates and that this is not being described in greater detail because this already belongs to the state of the art for the Watanabe reference. Consequently, what it is all about is only the transformation by calculation from one into another system of coordinates. Fading in system of coordinates is not disclosed according to the Watanabe reference.

In contrast, the present invention as claimed provides for a process and an apparatus which fades an image of the real robot into the real environment. The Watanabe reference fades in only the workpiece rather than the robot itself. One could argue that fading in of the robot was not obvious even in respect to the Watanabe reference by stating that the cameras that record the image are mounted, in principle, on the robot hand according to Watanabe reference, so that a recording of the image of the robot per se is not possible according to the Watanabe reference.

Finally, another different aspect of the present invention as claimed, which is not disclosed by the Watanabe reference is that a virtual robot or the movements, paths, etc. of such a robot may be faded into the image of a real environment. It is known in the general state of art of offline programming that a virtual robot can be faded into a virtual environment.

The image of a real welding path is faded in the Watanabe reference into the image of a real workpiece.

An offline simulation can take place, for example, on the operating device due to this third aspect according to the present invention as claimed, during the online programming of the real robot. This is disclosed, for example, on page 10, second and third paragraphs of the specification.

Applicant further notes that Watanabe reference does not provide any suggestion or motivation which would lead a person of ordinary skill in the art to believe that a robot-specific system would be beneficial. Instead, the Watanabe only leads a person of ordinary skill in the art to focus on the workpiece, completely different from the present invention as claimed.

Therefore, it is Applicant's position that the Watanabe reference fails to anticipate or suggest the present invention as claimed in claims 1 and 23.

Claims 2 and 24:

The Patent Office takes the position that the Watanabe '284 reference further discloses a plurality of coordinate systems including the world coordinate system and the coordinates of the positions of the working path are detected and superimposed on the image of the reference work (e.g., column 12, lines 10-21).

It is Applicant's position that because the dependent claims 2 and 24 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 2 and 24 are not anticipated or suggested by the reference in question.

Claims 3 and 25:

The Patent Office takes the position that the Watanabe '284 reference further discloses a plurality of coordinates being faded/superimposed on the reference image and the coordinates are given as coordinates to a tool coordinate system fixed on the distal end portion of the hand of the robot (column 2, lines 40-49).

It is Applicant's position that because the dependent claims 3 and 25 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 3 and 25 are not anticipated or suggested by the reference in question.

Claims 4 and 25:

The Patent Office takes the position that the Watanabe '284 reference further discloses the coordinate positions of the working path being faded/superimposed on the reference image or the working object relative to the axes of the three-dimensional or two-dimensional space (column 2, lines 28-49).

It is Applicant's position that because the dependent claims 4 and 25 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 4 and 25 are not anticipated or suggested by the reference in question.

Claims 5 and 27:

The Patent Office takes the position that the Watanabe '284 reference further discloses an image of a control element (working path) of a robot manual programmer (operator)

movable in at least two dimensions (either two-dimensional space or three-dimensional space) in faded in /superimposed over the image of the working object (column 5, lines 10-17 and column 12, lines 45-67).

It is Applicant's position that because the dependent claims 5 and 27 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 5 and 27 are not anticipated or suggested by the reference in question.

Claims 6 and 28:

The Patent Office takes the position that the Watanabe '284 reference further discloses an image of a control element such as a working path of a robot and the orientation of the robot hand are utilized (column 4 and column 7, lines 20-40).

It is Applicant's position that because the dependent claims 6 and 28 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 6 and 28 are not anticipated or suggested by the reference in question.

Claims 7 and 29:

The Patent Office takes the position that the Watanabe '284 reference further discloses at least one tool moved by a robot (Figs. 3-5), preferably several robot elements are faded into a working environment of a robot (Figs. 3-5).

It is Applicant's position that because the dependent claims 7 and 29 depend on the independent claims 1 and 23 respectively and include all of the combination of features which

are not suggested nor anticipated by the prior art of the Watanabe reference, claims 7 and 29 are not anticipated or suggested by the reference in question.

Re Claims 8 and 30:

The Patent Office takes the position that the Watanabe '284 reference further discloses teaching an attitude of a tool center point to the robot and a working path in relation to the reference work (column 7-8) and the thinning process of redundant detected points (column 7-8).

It is Applicant's position that because the dependent claims 8 and 30 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 8 and 30 are not anticipated or suggested by the reference in question.

Re Claims 9 and 31:

The Patent Office takes the position that the Watanabe '284 reference further discloses an image of a control element (working path) of a robot manual programmer (operator) movable in at least two dimensions (either two-dimensional space or three-dimensional space) in faded in /superimposed over the image of the working object (column 5, lines 10-17 and column 12, lines 45-67).

It is Applicant's position that because the dependent claims 9 and 31 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 9 and 31 are not anticipated or suggested by the reference in question.

Claims 10 and 32:

The Patent Office takes the position that the Watanabe '284 reference further discloses the coordinate positions of the working path being fadedhuperimposed on the reference image or the working object relative to the axes of the three-dimensional or two-dimensional space (column 2, lines 28-49).

It is Applicant's position that because the dependent claims 10 and 32 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 10 and 32 are not anticipated or suggested by the reference in question.

Claims 11 and 33 :

The Patent Office takes the position that the Watanabe '284 reference further discloses adapting a robot working path to the position of a detected, real work-piece or the working object, a virtual image of the working object with a robot path adapted thereto is faded in, so that by superimposing the virtual work object image with the image of the real object it is possible to adapt the robot path to be performed to the position of the real working object (column 7-8 and column 12).

It is Applicant's position that because the dependent claims 11 and 33 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 11 and 33 are not anticipated or suggested by the reference in question.

Claims 12 and 34:

The Patent Office takes the position that the Watanabe '284 reference further discloses the working area reachable by a robot and/or a permitted operating area is visualized on the viewing device (column 12).

It is Applicant's position that because the dependent claims 12 and 34 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 12 and 34 are not anticipated or suggested by the reference in question.

Claims 13 and 35:

The Patent Office takes the position that the Watanabe '284 reference further discloses movement corridors of a robot tool, robot hand and/or further robot elements are visualized on the viewing device (column 5, lines 10-30 and column 12, lines.

It is Applicant's position that because the dependent claims 13 and 35 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 13 and 35 are not anticipated or suggested by the reference in question.

Claims 14 and 36:

The Patent Office takes the position that the Watanabe '284 reference further discloses permanent and/or instantaneous associations of at least one manual programmer of at least one robot are visualized (column 12, lines 45-67).

It is Applicant's position that because the dependent claims 14 and 36 depend on the independent claims 1 and 23 respectively and include all of the combination of features which

are not suggested nor anticipated by the prior art of the Watanabe reference, claims 14 and 36 are not anticipated or suggested by the reference in question.

Claims 15 and 37:

The Patent Office takes the position that the Watanabe '284 reference further discloses the position and orientation of the display are detected by fixed markings in space (column 12, lines 45-67).

It is Applicant's position that because the dependent claims 15 and 37 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 15 and 37 are not anticipated or suggested by the reference in question.

Claims 17 and 38:

The Patent Office takes the position that the Watanabe '284 reference further discloses the position and orientation of the viewing device are determined optically (column 12, lines 45-67).

It is Applicant's position that because the dependent claims 17 and 38 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 17 and 38 are not anticipated or suggested by the reference in question.

Claims 19 and 39:

The Patent Office takes the position that the Watanabe '284 reference further discloses the robot-specific information (e.g., the working line or the working path of the robot is the

robot-specific information; column 8, lines 50-60) corresponding to this determination is faded over the image of the real environment on the viewing device (e.g., the image of the camera 2 or 12 is displayed on a screen of the image display device 3 and the detected point positions constituting the working line are displayed while being superimposed on this image; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-46).

It is Applicant's position that because the dependent claims 19 and 39 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 19 and 39 are not anticipated or suggested by the reference in question.

Claims 20-22 and 40-44:

The Patent Office takes the position that the Watanabe '284 reference further discloses the robot-specific information (e.g., the working line or the working path of the robot is the robot-specific information; column 8, lines 50-60) corresponding to this determination is faded over the image of the real environment on the viewing device (e.g., the image of the camera 2 or 12 is displayed on a screen of the image display device 3 and the detected point positions constituting the working line are displayed while being superimposed on this image; column 5, lines 10-17 and column 12, lines 45-67 and column 13, lines 1-46).

It is Applicant's position that because the dependent claims 20-22 and 40-44 depend on the independent claims 1 and 23 respectively and include all of the combination of features which are not suggested nor anticipated by the prior art of the Watanabe reference, claims 20-22 and 40-44 are not anticipated or suggested by the reference in question.

Claim Rejections-35 U.S.C. §103

Claims 16 and 38 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe).

Claims 16 and 38:

The claims further recite markings are detected by radio receivers. The Patent Office admits that the Watanabe reference is silent to the markings but postulates that it would have been obvious to have incorporated radio receivers to collect the working path information or to serve as an image pickup device because Watanabe discloses a general image pickup device such as a camera or an optical receiver for collecting the path information (Watanabe Figs. 1-5) and thereby suggesting the claim limitation of an image pickup device such as the radio receivers. Moreover, the Patent Office further suggests that radio receiver can be used in replace with the optical receiver as an alternative image and information collection device and one of the ordinary skill in the art would have been motivated to use an alternative receiver to collect the robot working path information and to pick up the image information when necessary (column 9- 10).

Claims 18 and 40 are rejected under ,35 U.S.C. 1 03(a) as being unpatentable over Watanabe et al. U.S. Patent No. 6,763,284 (hereinafter Watanabe) in view of Mizuno et al. U.S. Patent No. 5,876,325 (hereinafter Mizuno).

Claims 18 and 40:

The claims further recite data spectacles to be worn by a user for displaying the robot information and the Patent Office admits that the Watanabe reference is silent to the claim

limitation, and relies on the Mizuno reference to disclose an HMD for displaying the robot information (Mizuno Fig. 28 ' and 35) and further postulates that it would have been obvious to have incorporated HMD to display the robot information because Watanabe discloses a display device connected to the robot for collecting the robot specific information (Watanabe Figs. 1-5) and Mizuno disclosed HMD coupled to the robot manipulators for collecting the robot specific information (Mizuno Figs. 28 and 35) and therefore an alternative display device can be used to collect the robot specific information to come to a conclusion that one of the ordinary skill in the art would have been motivated to use an alternative display device such as an HMD so that an operator armed with HMD can directly see the work performed while specifying the points along the working path (Watanabe column 12, lines 45-67).

It is Applicant's position that claims 16, 18, 38, and 40 are not obvious in view of the Watanabe and Mizuno references. The present invention as claimed provides for a combination of features not taught by the prior art as a whole including the two references. For instance, there are several differences for the present invention as claimed as mentioned above, one of which is that the robot-centric image is faded in.

The combination of features not taught by the prior art provides several improved effect for the present invention as claim. For instance, the present invention as claimed has the advantage of providing a more answer-oriented environment for operating a robot.

Further, there must be some suggestion or teaching in the prior art as a whole which would lead the person of ordinary skill in the art to provide the combination as claimed. As the prior art as a whole fails to direct the person of ordinary skill in the art toward the claimed

combination, the invention should be considered not anticipated, non-obvious and thus patentable.

Therefore, Applicant finds that the Watanabe and Mizuno references do not anticipate the current invention and there is no suggestion or motivation to use the teachings of the references to provide the combination as claimed.

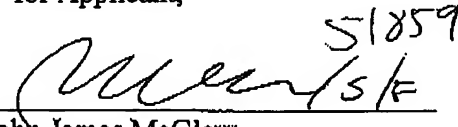
As the prior art fails to suggest the combination of features as claimed, Applicant respectfully requests that the Examiner favorably consider the claims as now presented in view of the amended claims and in view of the discussion above. Applicant respectfully solicits allowance of this application.

It is applicant's position that all claims are now allowable. Should the Examiner determine that issues remain that have not been resolved by this response, the Examiner is requested to contact Applicant's representative at the number listed below.

Favorable action is requested.

Respectfully submitted
for Applicant,

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APPLICANT REQUESTS THAT THE TWO MONTHS (2) EXTENSION OF TIME FEE BE CHARGED TO THE REPRESENTATIVE'S DEPOSIT ACCOUNT NO. 13-0410. SHOULD ANY OTHER FEE BE REQUIRED, THE PATENT AND TRADEMARK OFFICE IS HEREBY REQUESTED TO CHARGE SUCH FEE TO OUR DEPOSIT ACCOUNT 13-0410.

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